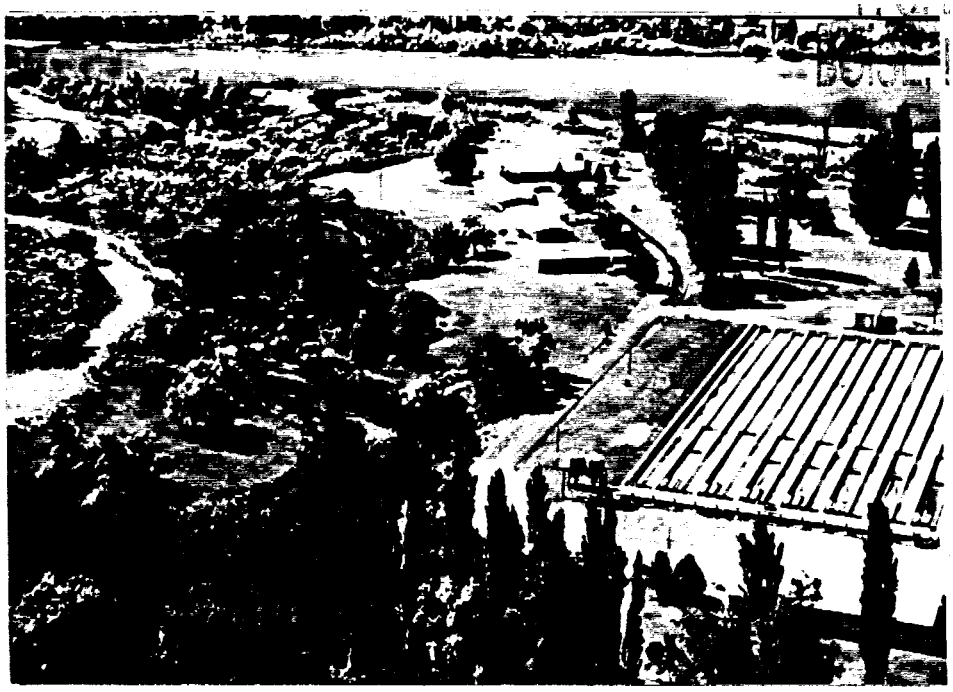
Idaho Power

NIAGARA SPRINGS HATCHERY

1989 Brood Year Report



by

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ABSTRACT

Niagara Springs received 1,925,795 eyed eggs from Pahsimeroi Hatchery and 833,397 eyed eggs from Oxbow Hatchery for a total of 2,759,192 eggs. Egg shipments were received beginning April 24 and ending June 9, 1989.

A total of 590,498 pounds of feed was fed throughout the brood year, producing 476,170 pounds of fish for a conversion of 1.24. The total feed cost for the year was $177,142.13 for a feed cost per pound of fish of 37.2 cents.

In the fall of 1989, 603,000 fingerlings weighing 10,770 pounds were released in the Salmon River and its tributaries. Spring smolt releases totaled 1,903,300 fish weighing 465,400 pounds and averaging 4.09 fish per pound. Spring smolt releases included 501,600 smolts (weighing 118,400 pounds) into the Pahsimeroi River, 225,500 smolts (weighing 53,700 pounds) into Hazard Creek, 229,000 smolts (weighing 47,500 pounds) into Hammer Creek, and 947,200 smolts (weighing 245,800 pounds) into the Snake River below Hells Canyon Dam. Fish releases for brood year 1989 totaled 2,506,300 fish weighing 476,170 pounds.

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INTRODUCTION

Niagara Springs Steelhead Hatchery, one of the largest privately-owned hatcheries in the United States, is located in the Snake River Canyon ten miles south of Wendell, Idaho. Niagara Springs is one of four hatcheries in the state which is operated and staffed by the Idaho Department of Fish and Game (IDFG), but is owned and financed by Idaho Power Company (IPC). It is part of IPC's multimillion dollar fish conservation program required under the terms of the Federal Energy Regulatory Commission license for the operation of the Hells Canyon hydroelectric complex. The purpose of this hatchery is to relocate a portion of the Snake River steelhead run into the Salmon River and to enhance the steelhead run in the Snake River below Hells Canyon Dam.

The hatchery's water supply is by gravity flow from Niagara Springs, with a constant water temperature of 58°F. Idaho Power's water rights are 132 cubic feet per second (cfs) of the approximately 260 cfs of water from Niagara Springs. The spring supplies water to 20 upwelling incubators and 20 circular vats during hatching and early rearing and 14 raceways (300 x 10 x 3 ft). Niagara Springs water is also available for domestic use and irrigation of ten acres of lawn.

Buildings on the hatchery grounds include four residences (three wood frame houses and a mobile home); a large metal building containing an office, two incubator rooms, a workshop, and garage; a small storage building; and a building which stores a 20-ton chiller unit.

OBJECTIVES

The two goals of IPC are to enhance the steelhead trout Oncorhynchus mykiss run in the Snake River below Hells Canyon Dam and to relocate part of this run to the Salmon River and it's tributaries. The two main objectives which must be met by Niagara Springs Hatchery to achieve these goals are:

1. To rear 200,000 pounds of steelhead smolts to be released in the Salmon River and it's tributaries.

2. To rear 200,000 pounds of steelhead smolts to be released in the Snake River below Hells Canyon Dam.

EGG SHIPMENTS AND EARLY REARING

Pahsimeroi Hatchery shipped 1,925,795 eyed steelhead eggs to Niagara Springs between April 24 and June 9, 1989. These fish were moved to outside nurseries between June 1 and July 9. At the time the fry were moved to the outside nursery raceways, there was a 92.3% survival rate. Eyed eggs received from the Oxbow Hatchery arrived from April 26 through May 5; these fish were moved to outside nurseries between June 1 and

June 5, 1989. The Oxbow egg to fry survival rate was 86.3%.

Fry were started on a soft-moist diet feed from Rangen Inc. at the point of 50% swim-up. Nursery feeding was done by sight until the fry began feeding well. Fry were fed once per hour, ten times per day. Once fry were moved to the outside nurseries, feeding rates were determined using the hatchery constant method (Piper et al. 1982).

FEEDING

Niagara Springs Hatchery used Rangens brand feed throughout brood year 1989. Biosponge feed was also used in a feed experiment which compared Rangen and Biosponge feeds. Fry were started on Rangen's soft-moist diet and later switched to Rangen's Salmon dry diet.

A total of 590,498 pounds of feed was fed during brood year 1989 at a cost of $177,142.13. A total of 476,170 pounds of fish were raised for a conversion of 1.24 (Figure 1). The cost per pound of fish raised was 37.2 cents (based on feed cost).

Fish were fed by hand in nursery vats and by electric Nielson Feeders, set by a timer to correspond to the photoperiod, in the outside nursery raceways. Once the fish were large enough for Rangen's 3/32 pellet, fish were fed using bridge-mounted Nielsen Feeders. Fish were inventoried (pound counts) once per month to determine feeding rates.

FISH HEALTH

On May 16 and 17, 1989, all outside raceways were disinfected with 12.5% chlorine solution to prevent disease contamination and algal growth. Upon arrival, all eyed eggs were disinfected with a 1:100 solution of argentyne for 10 minutes before being placed in incubators to prevent disease transmittal. During adipose fin clipping and coded wire tagging (CWT), a prophylactic treatment of Benzalkonium Chloride was administered at a rate of 2 ppm in a 1-hour drip for three consecutive days.

Raceways were swept daily, with waste removed by a gravity flow pipe discharging into the settling pond. One broom was used for each raceway, and the brooms were periodically disinfected to prevent disease transmission. Head screens were cleaned at least once per week. Water flows and raceway volumes were increased as densities increased. Maximum flows (130 cfs) and volume (7500 cubic feet per raceway) were achieved by December 19, 1989. Flows decreased in March and April, dropping to 110 cfs, due to a fluctuation in flow from the spring. Figure 2 shows average monthly water flows used during brood year 1989.

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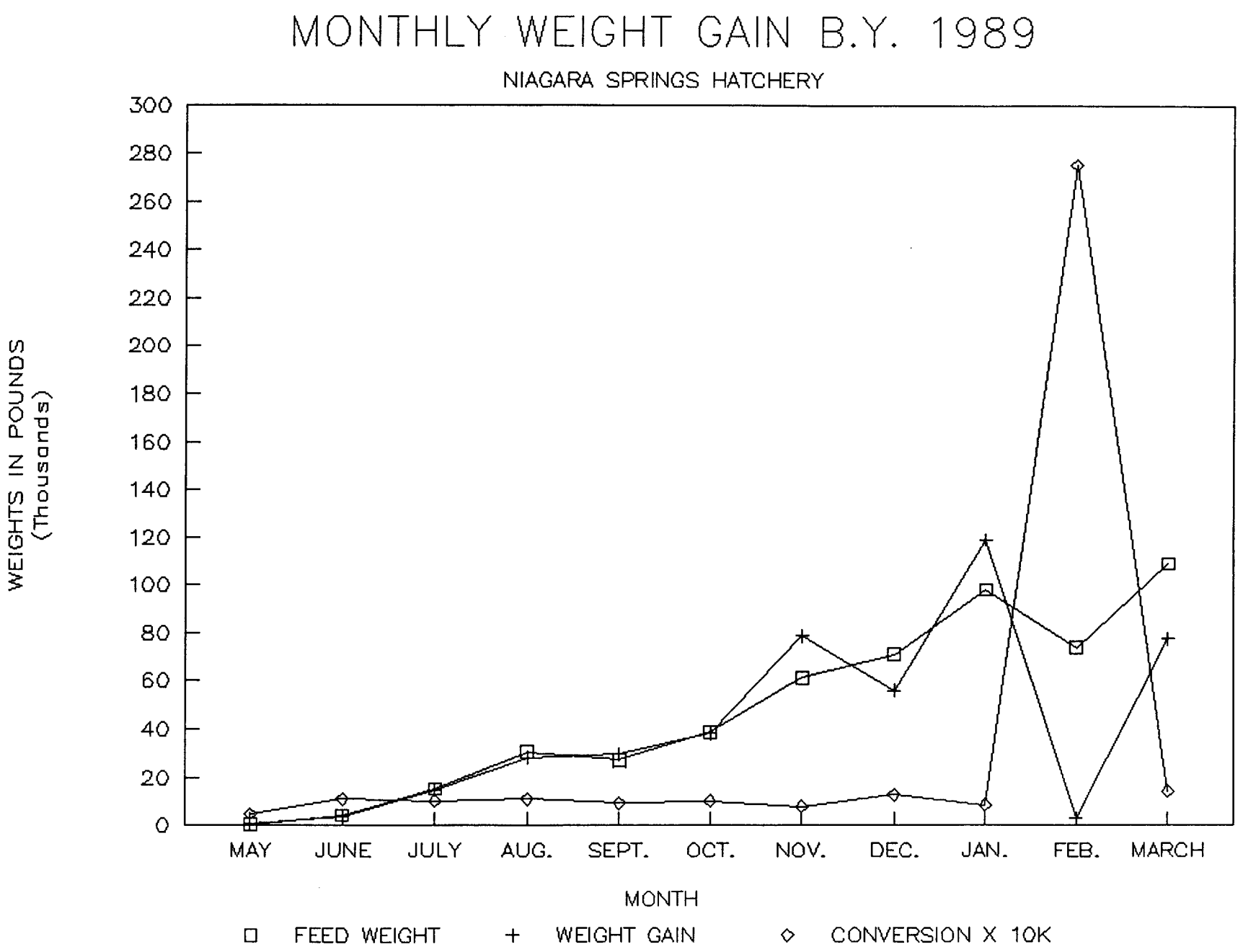

Figure 1. Monthly weight gain, pounds of feed used, and conversion at Niagara Springs Hatchery for brood year 1989.

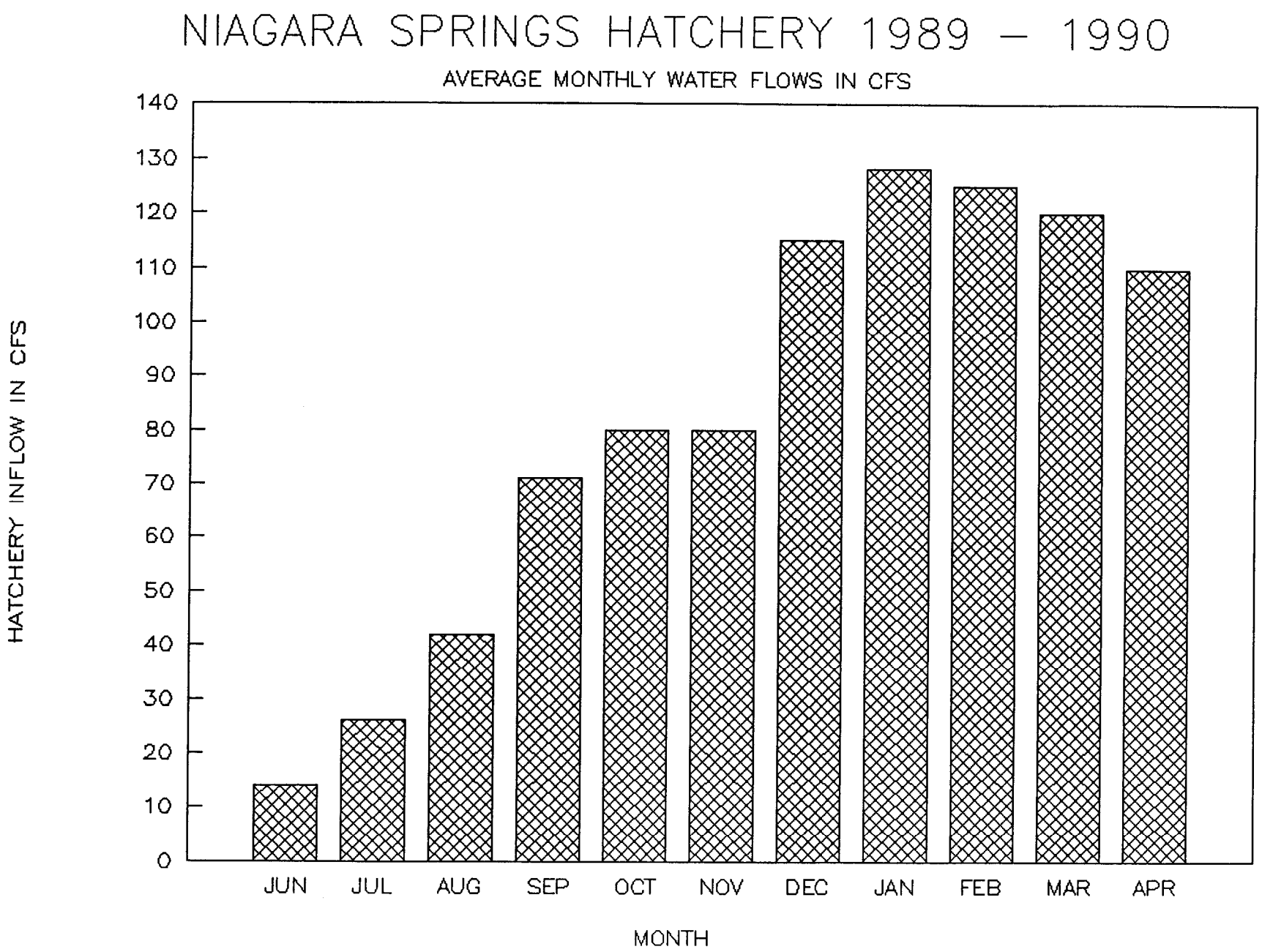

Figure 2. Average monthly water flows at Niagara Springs Hatchery for brood year 1989.

Furunculosis Aeromonas salmonicida was the only significant disease problem affecting brood year 1989 fish. The first outbreak was diagnosed in mid-November, and all raceways were then put on Romet-30 medicated feed for a 5-day treatment at 1% body weight (or 2.27 gm of active ingredient per 100 lbs of fish) to prevent further outbreaks. As in the past, furunculosis cycled every 35 days, more often as the densities increased in March and April. Fish were taken off feed for at least 24 hours before beginning each 5-day Romet-30 treatment so the fish would more readily consume the medicated feed.

Due to early diagnosis of furunculosis and timely Romet-30 shipments from Rangen Inc., mortality from furunculosis was held to 0.5% with a total of 10,600 mortalities. A total of 59,510 pounds of Romet-30 feed was fed during outbreaks in November, January, February, and March. Furunculosis outbreaks were confined to raceways #1 and #6 until March, when raceways #2-5 experienced the disease. Stress caused by high densities (> 0.5) and low dissolved oxygen (5.0 ppm, 3.5 ppm after feeding) made fish more susceptible to the bacterial infection.

During IDFG Fish Pathologist Kent Hauck's monthly Hatchery Assessment on February 23, 1989, infectious pancreatic necrosis virus (IPNV) was isolated from two fish sampled. No significant mortality was attributed to this virus. Fish health examinations and fish health assessment confirmed the presence of Aeromonas salmonocida bacteria, as well as IPN virus, Bacterial Kidney Disease, and Bacterial Coldwater Disease.

FISH MARKING

Fin Clipping

Between August 15 and September 5, 1989, an adipose fin clipping crew clipped adipose fins on all steelhead. Adipose fins are clipped on hatchery steelhead to help protect the "wild" run of steelhead in Idaho by helping fishermen differentiate between "wild" and "hatchery" steelhead. Also at this time, steelhead are counted and an accurate inventory is obtained.

A total of 2,530,237 steelhead were clipped in 1989. Clipping mortality was 2,457 fish or 0.1%.

Coded Wire Tagging

During October 10 through October 17, 1989, 93,315 steelhead received CWTs. Of the CWT fish, 44,375 were released at the Pahsimeroi trap and 45,750 were released into Hazard Creek. All CWT fish were marked with a left ventral clip to help biologists and fishermen identify CWT fish. Tag data is summarized in Table 1.

Table 1. Brood year 1989 coded wire tag summary for steelhead at Niagara Springs Hatchery.

CWT #	Number tagged	Mortality to release	Total tags	% Tag retention	Tagged fish
10-42-21	15,579	444	15,135	98.5	14,908
10-42-22	14,984	428	14,556	98.5	14,338
10-42-23	15,807	451	15,356	98.5	15,126
TOTALS	46,370	1,323	45,047		44,371
10-42-24	15,905	263	15,642	99.1	15,501
10-42-25	15,394	254	15,140	99.1	15,004
10-42-26	15,646	258	15,388	99.1	15,250
TOTALS	46,945	775	46,170		45,754

FISH RELEASES

A total of 603,000 presmolts weighing 10,770 pounds were released between September 19 and September 22, 1989 (Table 2). Fall presmolt releases were transported using IDFG tankers.

Spring smolt releases began on April 9 and ended April 27, 1990. The Salmon River and its tributaries received 956,100 smolts weighing 219,600 pounds. The number of fish per pound averaged 4.35, with an average length of 8.31 inches. The Snake River received 947,200 smolts weighing 245,800 pounds. The number of fish per pound averaged 3.85, with an average length of 8.66 inches. See Table 3 for a summary of spring smolt releases. Total presmolt and smolt releases for brood year 1989 were 2,506,300 fish for a record 476,170 pounds. Some problems were encountered with furunculosis and may be partially attributed to the high fish rearing densities (see previous fish health section).

Smolts were hauled using two IPC tankers and three Lower Snake River Compensation tankers which were pulled by private contract drivers.

SPECIAL STUDIES

On September 1, 1989, a feed experiment was set up to compare Rangen's Inc. salmon grower with Biosponge Aquaculture Products Company's salmon grower. Although Biosponge's product was slightly more expensive, their claim to a better conversion (1 to 1) would offset the cost difference making their feed more economical.

Experimental groups held in raceways 1 and 2 were started on Biosponge salmon crumble #4, while control groups held in raceways 3 and 6 were fed Rangen salmon grower #4 crumble. Both experimental and control raceways contained A-strain Pahsimeroi steelhead under similar conditions. The feed experiment was discontinued on November 27, 1989 due to an outbreak of furunculosis in raceways 1 and 6. All raceways were placed on Romet-30 medicated feed at this time to prevent further outbreaks in other raceways. During the three months the experiment ran, raceways 1 and 2 had a conversion of .73 to 1, while raceways 3 and 6 had a conversion of .88 to 1. Biosponge's cost per pound of growth was 24.9 cents, compared to 24.2 cents achieved by Rangen's feed (Table 4). A more in-depth study would be needed, comparing all feed sizes (from starter mash to 5/32 pellet) and medicated feeds from both companies, to gain more valuable information.

HATCHERY NEEDS AND IMPROVIIMENTS

Facilities at Niagara Springs Hatchery were originally designed to rear 200,000 pounds of steelhead smolts, using a maximum flow of 56 cfs.

Table 2. Brood year 1989 fall release dates, sites, number of pounds, number of fish, and size of fish (#/lb) released from Niagara Springs Hatchery.

Release date	Release site	# pounds	# fish	#/lb
9/19/89	Moyer Creek	870	50,000	57.5
9/19/89	French Creek	1,750	100,600	57.5
9/19/89	Hazard Creek	1,750	100,600	57.5
9/20/89	Twin Creek	970	50,100	51.6
9/20/89	Hughes Creek	970	50,100	51.6
9/21/89	Lemhi River	2,170	100,200	46.2
9/21/89	Yankee Fork	1,090	50,400	46.2
9/22/89	Indian Creek	600	50,500	84.2
9/22/89	Spring Creek	600	50,500	84.2
TOTALS		10,770	603,000	59.6

Table 3. Brood year 1989 spring release dates, sites, number of pounds, number of fish, and size of fish (#/lb) released from Niagara Springs Hatchery.

Release date	Release site	# pounds	# fish	#/lb
4\9 - 4\15\90	Pahsimeroi River	118,400	501,600	4.24
4\15 - 4\17\90	Hammer Creek	47,500	225,500	4.75
4\18 - 4\20\90	Hazard Creek	53,700	229,000	4.26
4\20 - 4\29\90	Hells Canyon	245,800	947,200	3.85
TOTALS		465,400	1,903,300	4.09

Table 4. Ending costs and growth for the Biosponge feed trial

	BIOSPONGE		***RANGEN***	
Raceway	1	2	3	6
Ending inventory	134088	134409	134556	132085
Ending weight	13219	13198	13849	12355
Ending length	6.16	6.15	6.25	6.06
Flow (cfs)	5.71	5.71	5.71	5.71
Flow (gpm)	2565	2565	2565	2565
Flow index	0.837	0.837	0.864	0.795
Pounds per cfs	2315	2311	2425	2164
Volume	7500	7500	7500	7500
Density index	0.29	0.29	0.3	0.27
Pounds per cubic foot	1.76	1.76	1.85	1.65
No. fish per pound	10.15	10.19	9.72	10.7
Hatchery constant	6.7	6.7	7.88	8.61

Due to increased production goals, to comply with IPC's Federal Energy Regulatory Commission license, the settling pond system needs to be modified and/or expanded to meet current EPA requirements.

Due to furunculosis disease outbreaks and extremely high densities of early rearing and final rearing containers, additional rearing space is requested. An additional five vats and six raceways would be needed to meet NPDES permit limitations to provide for more acceptable rearing densities.

Tail screens need to be moved forward to create a quiescent zone for settling out solid waste. The current situation is not effective with only an 18-inch quiescent zone. At full production, smolt activity keeps solid waste in suspension allowing it to enter Niagara Springs Creek and the Snake river. Keyways will need to be installed to accommodate this situation. Further research is required to determine the optimum size of the quiescent zone.

Screens and frames for early fry production are worn out and in need of replacement. Fry screens have wooden frames and require a great deal of maintenance every year (scraping, painting, repairing mesh screen, and re-nailing joints). Wood and mesh screening is also short-lived under raceway conditions. For a permanent solution, screens should be constructed from perforated stainless steel or aluminum with aluminum tubing frames. All other raceway screens should also be converted to similar materials over the next two years.

Safety concerns for employees are also being identified at this time. Bridge decking currently consists of 2 x 12 boards which are required to be replaced about every two years. As these boards swell and shrink during the year due to moisture content, the hatchery staff is continually adding boards to fill in gaps or removing boards as they swell and buckle. These boards also become slippery when they are wet, become frosted, or are snow covered. A non-skid grating would be more practical, safer, and in the long run, economical. Electrical outlets and connections should be waterproofed and the whole system put on a ground fault protector.

The main hatchery building is also in need of some minor improvements. The shop area and incubator room #2 need to be insulated to allow for working during winter months and to keep water lines from freezing. The working area in the shop has also been greatly decreased due to storing equipment in this area. This problem could be solved by building additional storage.

A 3-bay garage would solve our storage problem and allow us to protect valuable equipment from the weather. Currently, items such as the hatchery truck, fish pumps (old and new), and the boat are stored outside. Other pumps, lawn mowers, and chemicals are stored in the feed room, which is insulated and heated, or the shop, making it difficult to work in these areas. Along with these items being stored in a garage, we could also store screens and crowders in this building. A special room, insulated and heated, would need to be incorporated into this building for storage of paints, chemicals, gasoline, and oil.

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A fourth house is needed to replace the trailer house which is currently being used by one permanent employee. The heating system in the trailer house is inadequate during cold weather (indoor temperatures drop into the low 50s during cold months). The air conditioner is also unable to keep the trailer cool during the summer months. If a new house was built, the trailer house could be used to provide housing for temporary employees. This would be beneficial to us and the Department, allowing us to hire temporaries from outside this area. Temporaries with backgrounds in fisheries, who may be looking for a career with the Department, could be hired no matter where they were from.

Two other needs which have recently been brought to our attention are the need to modify or build public restrooms to accommodate handicapped people and to put in a well to supply drinking water for the public and to the four residences.

Many maintenance projects occurred at Niagara Springs Hatchery over the past year. Residential maintenance included new roofs on residences no. 1, no. 2, and no. 3. Air conditioners were installed into all four residences in August. Garage doors were also replaced on residences no. 2, no. 3, and no. 4.

Equipment replacements included installing a new water chiller unit used during fish transport and a new fish pump manufactured by Magic Valley Heli-Arc; which broke down while pumping fish and is still in the shop undergoing a major overhauling. The feeding bridge is also being overhauled by IPC. A new power cable, take-up reel, and drive motor have been installed and work is continuing on replacing the drive wheels and bearings.

Improvements to the hatchery grounds included putting up safety fencing around the settling pond and intake pool. Signs were also put up to insure public safety. Idaho State Parks and Recreation is in the process of improving IPC property on the east side of Niagara Springs. Improvements include blocking off the through road to make a parking only area and re-vegetating.

ACTIVITIES AND STAFF

Numerous slide shows and tours were given to school groups, scout groups, and visitors. Hatchery personnel assisted Oxbow Hatchery with the spawning of steelhead. Hatchery personnel have also assisted in an angler survey being conducted at Crystal Springs Lake by the regional fishery biologist. Hats are being given away as a reward for returned jaw tags in conjunction with this survey.

The hatchery staff at Niagara Springs Hatchery includes Jerry Mowery, Superintendent III; Gary Bertellotti, Superintendent I; Tom Herron, Fish Culturist; and Dan Baker, Fish Culturist. The temporary employees included Kent Greene, Bio-Aide and Andy Hanchey, Laborer.

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LITERATURE CITED

Piper, R.G., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler, J.R. Leonard. 1982. Fish Hatchery Management, United States Department of the Interior, Fish and Wildlife Service, Washington D.C. p. 517.

A P P E N D I C E S

Appendix A. A breakdown of feed used by Niagara Springs Hatchery during brood year 1989.

Feed size	Manufacturer	Cost/pound	Pounds	Total
Starter soft moist	Rangen	0.779	150	$122.69
1/32 soft moist	Rangen	0.715	250	$187.69
No. 1 dry	Rangen	0.400	2,200	$924.00
NO. 2 dry	Rangen	0.400	9,300	$3,906.00
No. 3 dry	Rangen	0.400	18,500	$7,770.00
No. 4 dry	Rangen	0.293	51,080	$15,687.95
	Biosponge	0.395	3,900	$1,617.53
3/32 dry	Rangen	0.257	77,760	$20,950.88
1/8" Salmon dry	Rangen	0.257	240,000	$64,663.20
1/8" Trout dry	Rangen	0.220	79,360	$18,332.16
3mm dry	Biosponge	0.315	15,950	$5,275.46
5/32 Salmon dry	Rangen	0.257	31,338	$8,443.40
TOTALS			529,788	$147,880.95
Medicated Feed				
TM 50	Rangen	0.500	200	$105.00
TM 100	Rangen	0.357	1,000	$374.43
Romet-30 sack	Rangen	0.426	11,900	$5,322.87
Romet-30 bulk	Rangen	0.420	19,780	$8,722.98
Romet-30	Rangen	0.457	27,830	$13,342.54
TOTALS			60,710	$27,867.82

TABLES

Appendix B. Niagara Springs production history for brood years 1969 to 1989.

Production season	Egg total	Total mortality	Percent loss	Number released	Pounds released	Feed conversio
1969-70	3,405,422	649,514	19.07	2,755,908	299,235	1.68
1970-71	2,835,608	534,646	18.85	2,300,962	201,778	1.90
1971-72	2,139,903	369,228	17.25	1,770,675	235,375	1.69
1972-73	10,670,485	5,904,134	55.33	4,766,351	169,667	1.57
1973-74	4,926,374	4,926,374	100.00	1,973,120	187,276	1.96
1974-75	3,440,242	2,067,44	60.10	1,372,793	167,493	2.10
1975-76	2,286,537	595,642	26.05	1,690,895	247,855	1.77
1976-77	3,218,686	1,643,985	51.08	1,574,701	251,732	1.80
1977-78	3,151,858	2,140,918	67.93	1,010,940	131,000	2.80
1978-79	2,489,419	1,116,865	44.86	1,372,554	243,920	2.60
1979-80	2,747,239	1,300,959	47.36	1,446,280	309,000	1.79
1980-81	2,195,426	720,172	32.80	1,475,254	316,330	1.96
1981-82	2,302,370	953,015	41.39	1,349,355	374,350	1.93
1982-83	2,929,527	1,794,387	61.25	1,135,140	181,150	1.90
1983-84	3,459,008	1,849,313	53.46	1,609,695	310,000	2.04
1984-85	2,932,164	706,071	24.08	2,226,093	314,650	1.72
1985-86	2,914,492	903,999	31.02	2,010,493	339,885	1.71
1986-87	2,274,371	422,476	18.58	1,851,895	419,000	1.33
1987-88	2,929,069	775,569	26.48	2,153,500	405,516	1.44
1988-89	2,680,332	1,014,132	37.84	1,666,200	406,700	1.41
1989-90	2,759,192	252,892	9.17	2,506,300	476,170	1.24
5-year average	2,711,491	673,814	24.85	2,037,678	409,454	1.43
Overall* average	3,188,068	1,285,768	40.33	1,902,299	290,040	1.82

*1973-74 data was not used in the overall average due to complete loss that year. After removing all fish and disinfecting, fish were brought in from Dworshak National Fish Hatchery to rear and eventually release.

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